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54 **Carding apparatus for textile materials.**

57 In a carding apparatus for fibrous material, of the type in which the staple fibres are fed by a feed roller (3) to an introduction roller (4) of a carding machine and are subjected to preliminary opening and impurity removal, at least one carding unit (7,8) is provided along the path between the introduction cylinder and the carding cylinder (10). The carding unit comprises a removal knife (13) at its inlet and a guide blade (17) for the fibres at its exit, a carding surface extending therebetween. The unit is position-adjustable in directions circumferential and radial to the introduction cylinder. The knife and blade can be adjusted independently in a prevalently radial direction to the introduction cylinder. Preferably two individually adjustable carding units (7,8) are provided. Between the carding unit or units and the carding cylinder there is provided a mixing and homogenizing carding cylinder (11).

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## CARDING APPARATUS FOR TEXTILE MATERIALS

This invention relates to a carding apparatus for textile materials, and more particularly to an apparatus of the type in which the staple fibres are fed along a feed table to a feed roller of a carding machine and are subjected to preliminary opening and impurity removal action along the path between an introduction cylinder and a carding cylinder of the carding machine.

Apparatus of this type is known in the art, its main purpose being to prepare the material for the actual carding action. It is precisely in the effectiveness of their fibre cleaning action and preliminary opening action that such known apparatus displays certain deficiencies, which often lead to unsatisfactory results in the preliminary carding action obtained by the carding machine.

In this respect, insufficient preliminary opening of the fibres, for example of cotton, is sometimes noted between the feed table and the carding cylinder, and/or excessive residual impurities and hard tufts in the material reaching the carding cylinder, these being impurities and hard tufts which have not been removed during the path upstream of the carding cylinder.

A further problem which can occur is excessive fibre wear by the cylinder card clothing.

An object of the present invention is to overcome these limitations and drawbacks by providing an apparatus of the initially specified type which improves the fibre preliminary opening action along the path between the introduction cylinder and the carding cylinder and also allows effective removal of impurities and hard tufts along the same path, so providing the carding cylinder with a cleaner and more homogeneous material, thus improving the quality of the sliver obtained at the machine exit.

A further object of the invention is to provide an apparatus of the aforesaid type which allows regulation of the quantity and quality of the trash and impurities to be removed, so increasing the efficiency of the removal knife cleaning.

A further object of the invention is to provide an apparatus in which thinner card clothing can be used, resulting in less wear of the fibres being worked and an improvement in the quality of the sliver leaving the machine.

These objects are attained according to the invention by a carding apparatus for textile materials of the initially specified type, characterised in that in that portion of the fibre path between the introduction cylinder and the carding cylinder there is disposed at least one carding unit provided with a removal knife and a guide blade for the fibres, the unit being position-adjustable circumferentially and radially to the introduction cylinder, between

said at least one carding unit and the carding cylinder there being disposed a mixing and homogenizing carding cylinder which cooperates in the discordant direction with the introduction cylinder and in the concordant direction with the carding cylinder.

Advantageously, means can be provided for independently adjusting the position of the unit support and of the knife and/or blade on the support.

Further details and advantages of the invention will be more apparent from the description of a preferred but not exclusive embodiment of the invention, illustrated by way of example on the accompanying drawing, which shows a section through the apparatus according to the invention.

On the drawing, the reference numeral 1 indicates a feed table for staple fibres 2 collected in the form of a blanket of generally rectangular cross-section, the fibres being advanced by a feed roller 3 in known manner.

An introduction cylinder 4, rotating at the feed point in a direction discordant to the direction of rotation of the feed cylinder 3, as indicated by the arrows, picks up the fibres 2 by means of the clothing 5 with which it is provided.

The staple fibres, pinched between the introduction cylinder 4 and the facing surface 6 of the feed table 1, are conveyed towards at least one guide blade unit 7 (or 8) located at a certain distance from the point 9 of pinching between the cylinder 4 and table 1, along the fibre path between the introduction cylinder 4 and a carding cylinder 10. Two carding units 7 and 8 are provided in the illustrated example.

Between the carding unit or units 7, 8 and the carding cylinder 10 there is disposed a mixing and homogenizing carding cylinder 11 cooperating in the discordant direction with the introduction cylinder 4 and in the concordant direction with the carding cylinder 10. The cylinders 10 and 11 are provided with respective card clothing, not shown in detail as it is well known.

Each carding unit 7, 8 is provided with a carding surface 12 facing the introduction cylinder 4 and provided with adequate clothing or with protuberances shaped to provide carding action. Upstream of the carding surface 12 each carding unit 7, 8 possesses a removal knife 13 arranged on the unit support 14 preferably position-adjustable in a direction prevalently radial to the introduction cylinder 4 as indicated by the arrows. For this purpose the knife 13 can comprise relative slots 15 extending in the adjusting direction and arranged to receive fixing screws 16 screwed into the support

14.

Downstream of the carding surface 12 each carding unit 7, 8 comprises a guide blade 17 having a guide surface 17a approaching the introduction cylinder 4 and of length such as to determine the quantity and quality of the fibres and non-fibrous material to remove. The blade 17 is also preferably position-adjustable in a direction prevalently radial to the introduction cylinder 4, for example by a system such as that used for the removal knife 13. Advantageously, as can be seen on the drawing, the removal knife 13 and the guide blade 17 of the carding units 7 and 8 are disposed in such a manner that they can be position-adjusted in directions which converge at a point external to the introduction cylinder.

According to one characteristic of the invention, at least the carding unit 7 is position-adjustable in a direction circumferential and radial to the introduction cylinder 4. For this purpose, as illustrated, the support 14 can be fixed to support arms 18 comprising a slot 19 extending concentrically to the cylinder 4 and through which there penetrates a fixing screw 20 which is screwed into the support 14. The support arm 18 can be position-adjusted radially to the cylinder 4 by a like system comprising a screw 21 and a slot 22 extending radially to the cylinder 4, the screw 21 being screwed into a fixed element, not shown, of the machine structure.

The carding unit 8 can also be position-adjusted radially to the cylinder 4 on a fixed support arm 25 by means of the slot 23 and screw 24 as illustrated. The unit 8 could also be position-adjustable in a direction circumferential to the cylinder 4, as the unit 7.

The two carding units 7 and 8 are preferably disposed such that the circumferential distance A between the point of introduction 9 of the fibres and the removal knife 13 of the first carding unit 7 is greater than the circumferential distance C between the point of exit of the fibres from the first carding unit 7 and the point of action of the removal knife 13 of the second carding unit 8. As can be seen from the drawing, between the introduction cylinder 4, carding cylinder 10 and mixing and homogenizing carding cylinder 11 there is inserted a fibre guide wedge 26.

In operation, the fibres conveyed by the introduction cylinder 4 undergo a preliminary opening and an initial cleaning action by the removal knife 13 of the unit 7. During this stage the quantity and quality of the impurities to be removed depends on the length A, which can be advantageously adjusted to obtain optimum conditions for the type of fibre treated.

Along the carding surface 12 of the unit 7 the fibrous material is arranged into a parallel flow, to then reach the adjustable guide blade 17 where the

fibres are guided onto the removal knife 13 of the unit 8. The quantity and quality of fibres and impurities to be removed depends here on the length B, ie substantially on the length of the portion 17a of the radially adjustable blade 17 of the unit 7, and on the length C. By virtue of the described adjustments the various elements can be positioned to obtain optimum clean-up conditions for the type of fibre treated.

The fibres then undergo in the carding unit 8 the same treatment undergone in the carding unit 7, so improving the effectiveness of the cleaning and parallel-arranging action and the fibre homogenization.

At their exit from the unit 8 the fibres conveyed by the introduction cylinder 4 encounter the mixing and homogenizing carding cylinder 11 which takes up the excess fibre quantity, which is then transferred to the carding cylinder 10 at the point of cooperation between the cylinder 11 and the cylinder 10.

From the foregoing description it is apparent that by making the carding units adjustable it is possible to improve the quality of the fibres fed to the carding cylinder 10 by more effectively removing impurities and hard tufts and performing a perfect preliminary opening action, by which the total carding intensity of the machine and the quality of the sliver obtained at its exit are substantially improved.

It is also possible to use thinner card clothing, with resultant less wear of the fibres being worked.

The described invention can undergo various modifications while remaining within the inventive concept. For example, more than two carding units could be provided. The two carding units could be position-adjusted circumferentially together instead of individually unit by unit. Again, it is not essential for the removal knives 13 and/or the guide blades 17 of all the carding units to be adjustable individually on their respective supports 14.

## Claims

1. A carding apparatus for textile materials in which the staple fibres are fed along a feed table to a feed cylinder a carding machine and are subjected to preliminary opening and impurity removal action along the path between an introduction cylinder and a carding cylinder of the carding machine, characterised in that along said path there is disposed at least one carding unit provided with a removal knife and a guide blade for the fibres, the unit being position-adjustable circumferentially and radially to the introduction cylinder, between said at least one carding unit and the carding cylinder there being disposed a mixing and homogenizing

carding cylinder which cooperates in the discordant direction with the introduction cylinder and in the concordant direction with the carding cylinder.

2. An apparatus as claimed in claim 1, characterised in that a fibre guide wedge is inserted between the introduction cylinder, the carding cylinder and the mixing and homogenizing carding cylinder. 5

3. An apparatus as claimed in claim 1, characterised in that several carding units, position-adjustable individually unit by unit, are provided. 10

4. An apparatus as claimed in claim 1, characterised in that several carding units, position-adjustable together in the direction circumferential to the introduction cylinder, are provided. 15

5. An apparatus as claimed in one of the preceding claims, characterised in that said at least one carding unit or at least one of said carding units comprises a removal knife which is position-adjustable on the unit support in a direction prevalently radial to the introduction cylinder. 20

6. An apparatus as claimed in one of the preceding claims, characterised in that said at least one carding unit or at least one of said carding units comprises a guide blade which is position-adjustable on the unit support in a direction prevalently radial to the introduction cylinder. 25

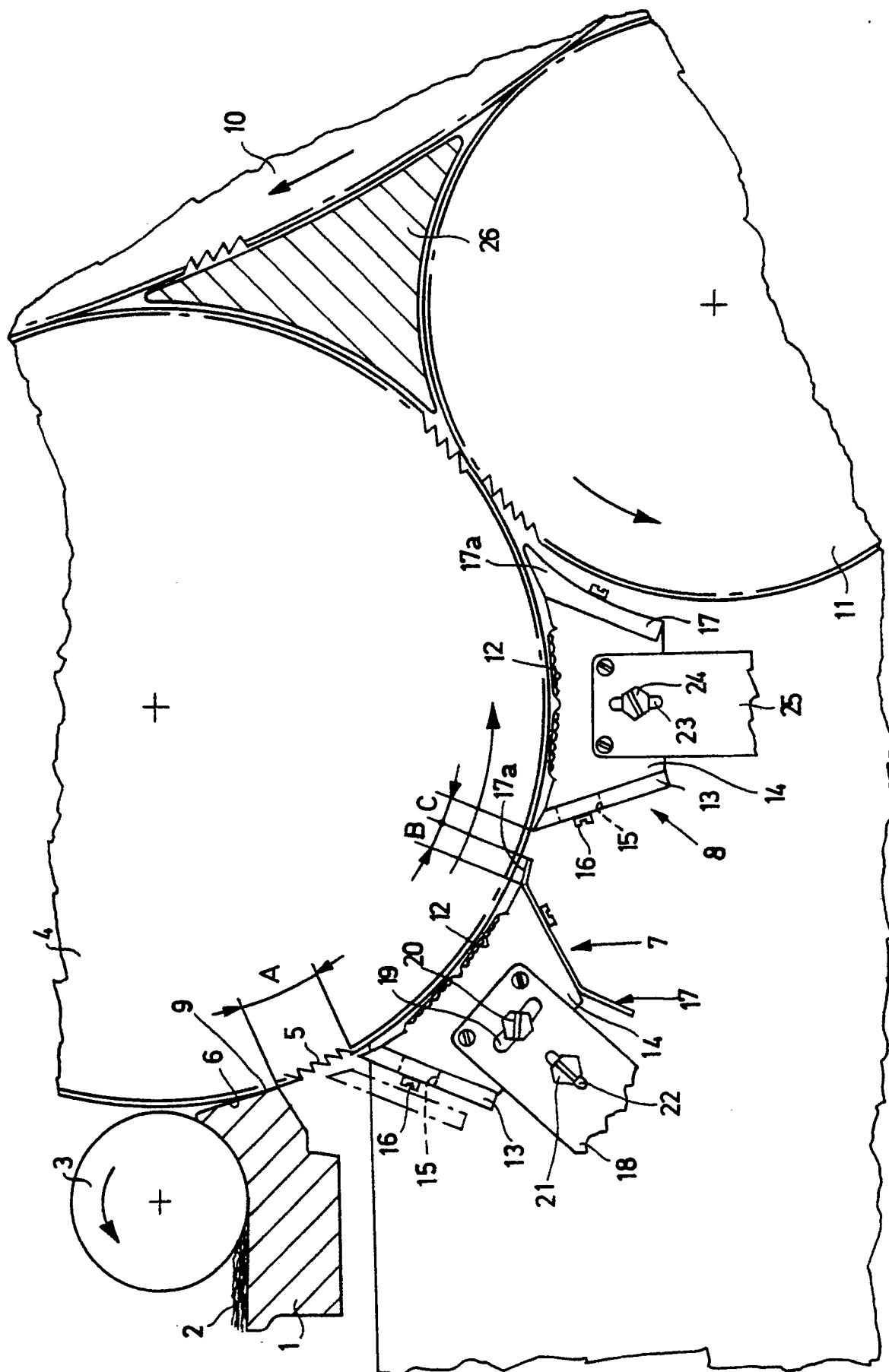
7. An apparatus as claimed in one of the preceding claims, characterised in that said at least one carding unit or at least one of said carding units comprises a removal knife and a guide blade, the directions in which they are position-adjustable converging at a point external to the introduction cylinder. 30

8. An apparatus as claimed in one of the preceding claims, characterised in that at least two successive carding units are disposed such that the circumferential distance between the point of introduction of the fibres and the removal knife of the first carding unit is greater than the circumferential distance between the point of exit of the fibres from the first carding unit and the point of action of the removal knife of the second carding unit. 35 40

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## EUROPEAN SEARCH REPORT

Application Number

EP 90 20 2493

### DOCUMENTS CONSIDERED TO BE RELEVANT

| Category                                                                           | Citation of document with indication, where appropriate,<br>of relevant passages            | Relevant<br>to claim                                                      | CLASSIFICATION OF THE<br>APPLICATION (Int. Cl.5) |
|------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------|---------------------------------------------------------------------------|--------------------------------------------------|
| Y,A                                                                                | DE-A-3 408 350 (ESTRUCH PORTELL,J.)<br>* page 5-6; figure unique *<br>- - -                 | 1,2,3,4,8,<br>9                                                           | D 01 G 15/34<br>D 01 G 15/20                     |
| Y,A                                                                                | GB-A-2 043 725 (BARCONS ESTEBANEII,J.)<br>* page 1, lines 45 - 88; figure unique *<br>- - - | 1,2,3,4,9                                                                 |                                                  |
| A                                                                                  | EP-A-0 295 060 (CARCLO ENGINEERING GROUP P.L.C.)<br>* column 4-8; figures 1, 2 *<br>- - -   | 1,5,6,9                                                                   |                                                  |
| A                                                                                  | CH-A-2 730 52 (NUCLOTEX LTD)<br>* the whole document *<br>- - -                             | 1,2,9                                                                     |                                                  |
| A                                                                                  | DE-C-1 197 97 (SONNEVILLE,J.ET AL)<br>- - - - -                                             |                                                                           |                                                  |
| The present search report has been drawn up for all claims                         |                                                                                             |                                                                           | TECHNICAL FIELDS<br>SEARCHED (Int. Cl.5)         |
|                                                                                    |                                                                                             |                                                                           | D 01 G                                           |
| Place of search                                                                    |                                                                                             | Date of completion of search                                              | Examiner                                         |
| The Hague                                                                          |                                                                                             | 07 February 91                                                            | MUNZER E.                                        |
| <b>CATEGORY OF CITED DOCUMENTS</b>                                                 |                                                                                             |                                                                           |                                                  |
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| P: intermediate document                                                           |                                                                                             | &: member of the same patent family, corresponding<br>document            |                                                  |
| T: theory or principle underlying the invention                                    |                                                                                             |                                                                           |                                                  |